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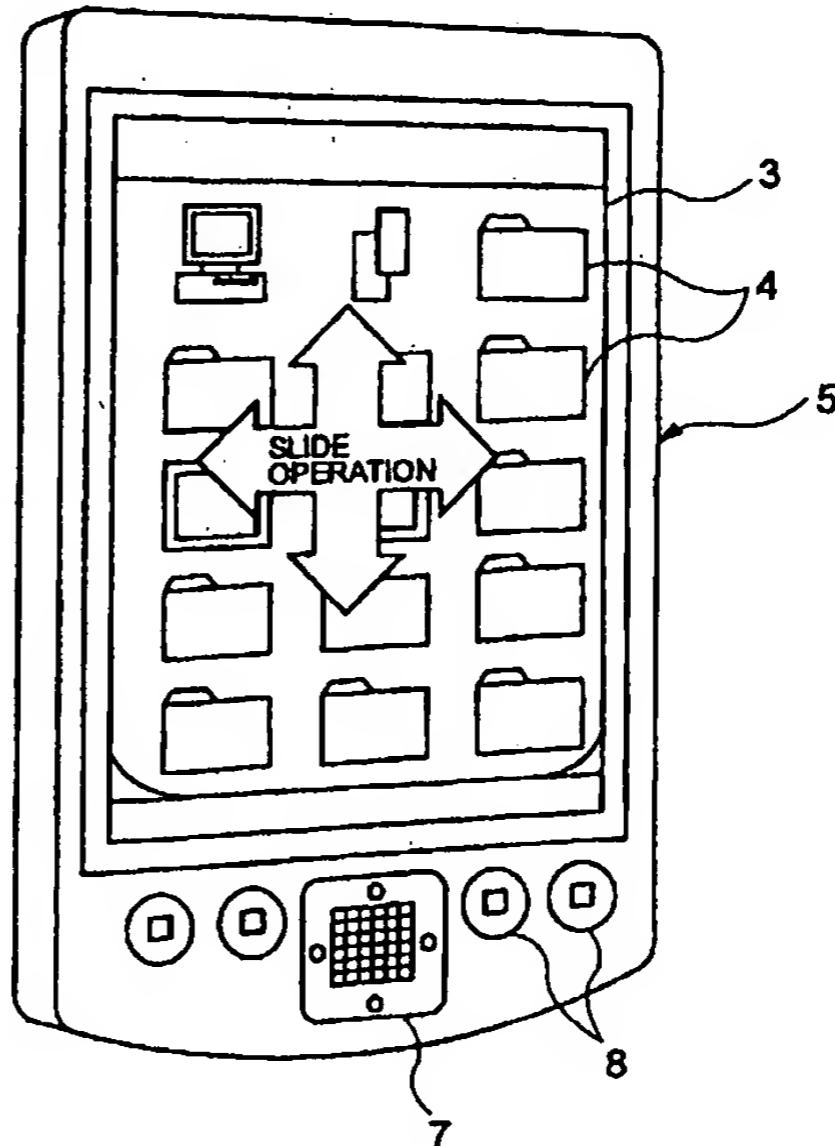
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(54) Abstract Title: Information processing apparatus with slideably mounted touch panel

(57) An information input apparatus comprises a body 5 and a touch panel portion 3 comprised of a display 1, for displaying an icon 4, and a touch panel (2, figure 2). The touch panel portion 3 is arranged to be slideable relative to the body 5, there are provided contact detecting means for detecting contact with an icon displayed in the touch panel portion 3, slide detection means for detecting the sliding of the touch panel portion 3 relative to the body 5 and an execution means for commencing the execution of a function responsive to an output from the slide detecting means and from the contact detecting means. The touch panel portion 3 may be mounted to the body 5 in a resilient manner by means of at least one elastic member connected to a rear face or side face of the touch panel portion 3. Said detecting means may include a piezoelectric element. The input apparatus may be in the form of a mobile phone or personal digital assistant in which accidental operation is prevented.

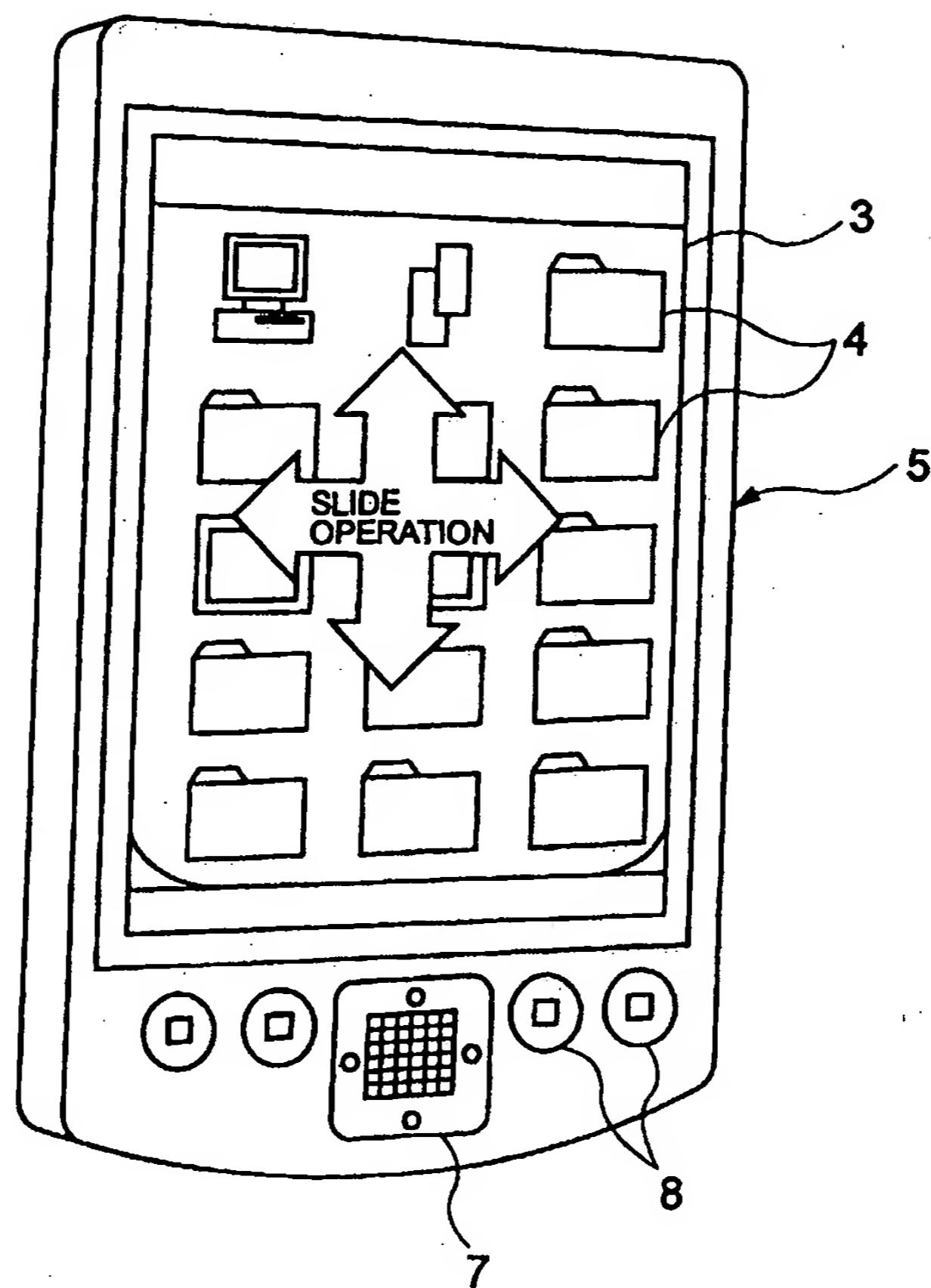
FIG. 1



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FIG. 1



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FIG. 2

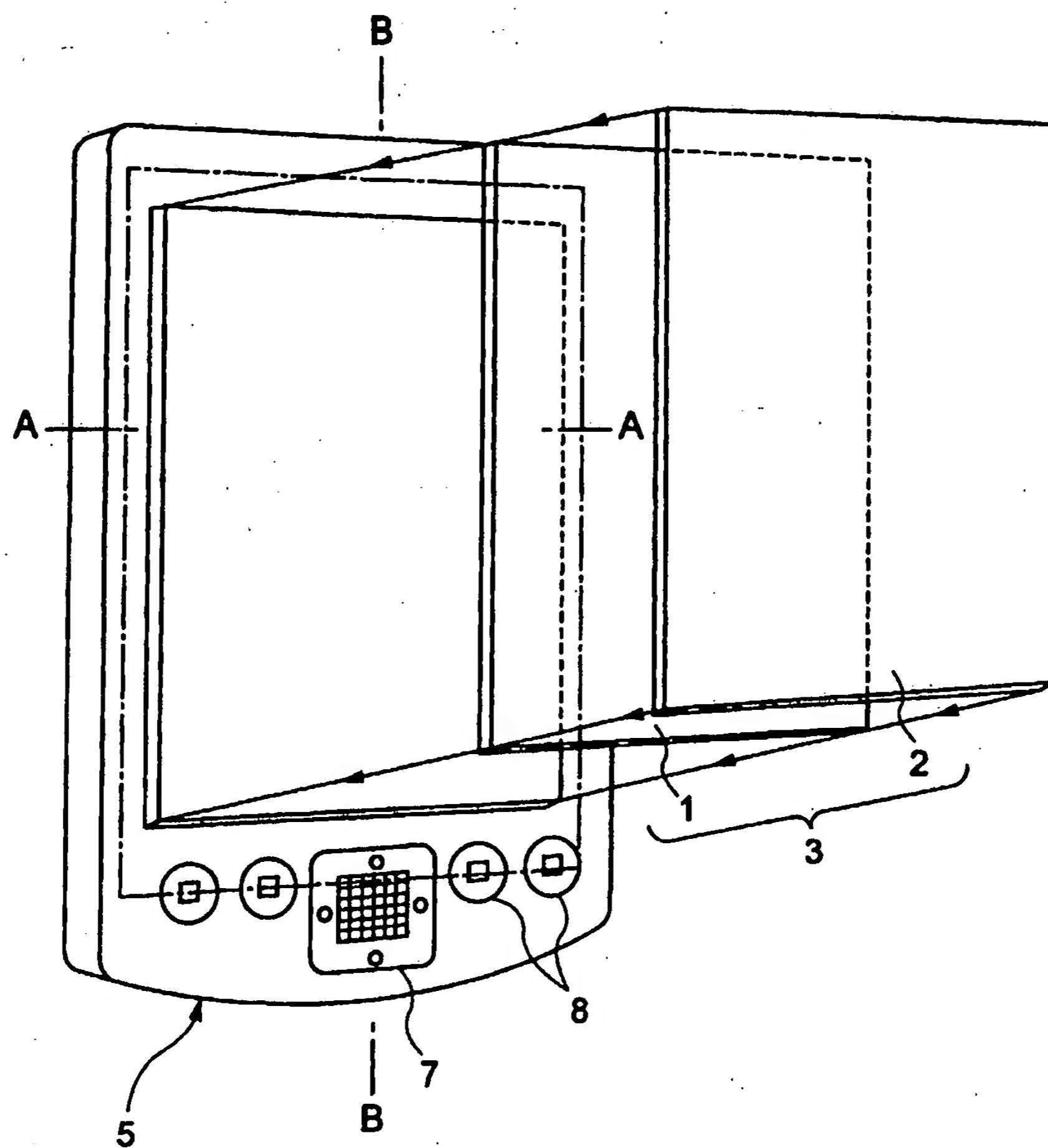


FIG. 3A

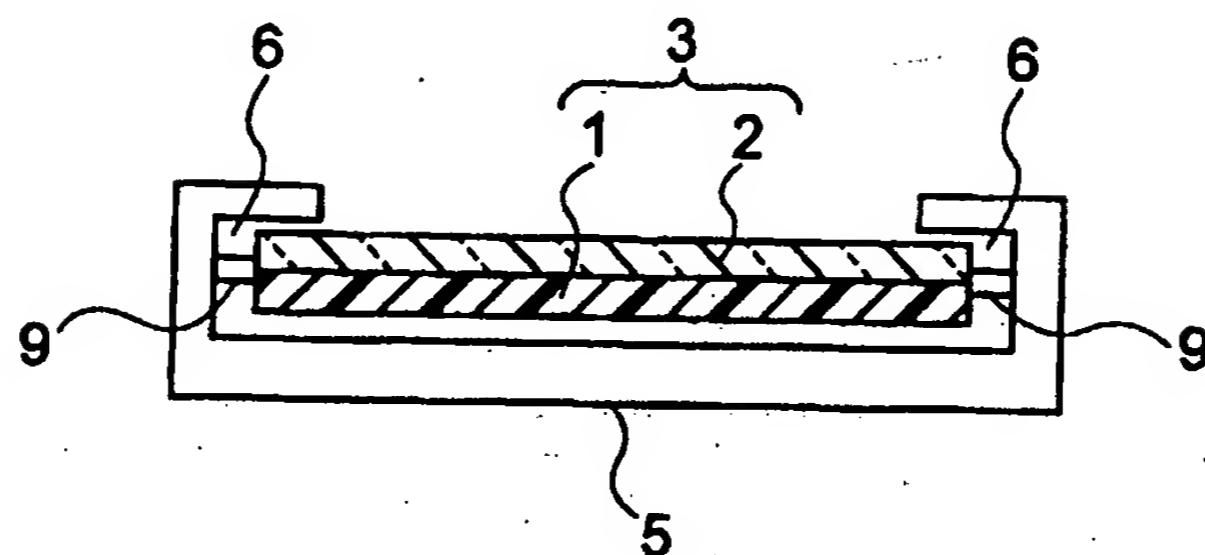


FIG. 3B

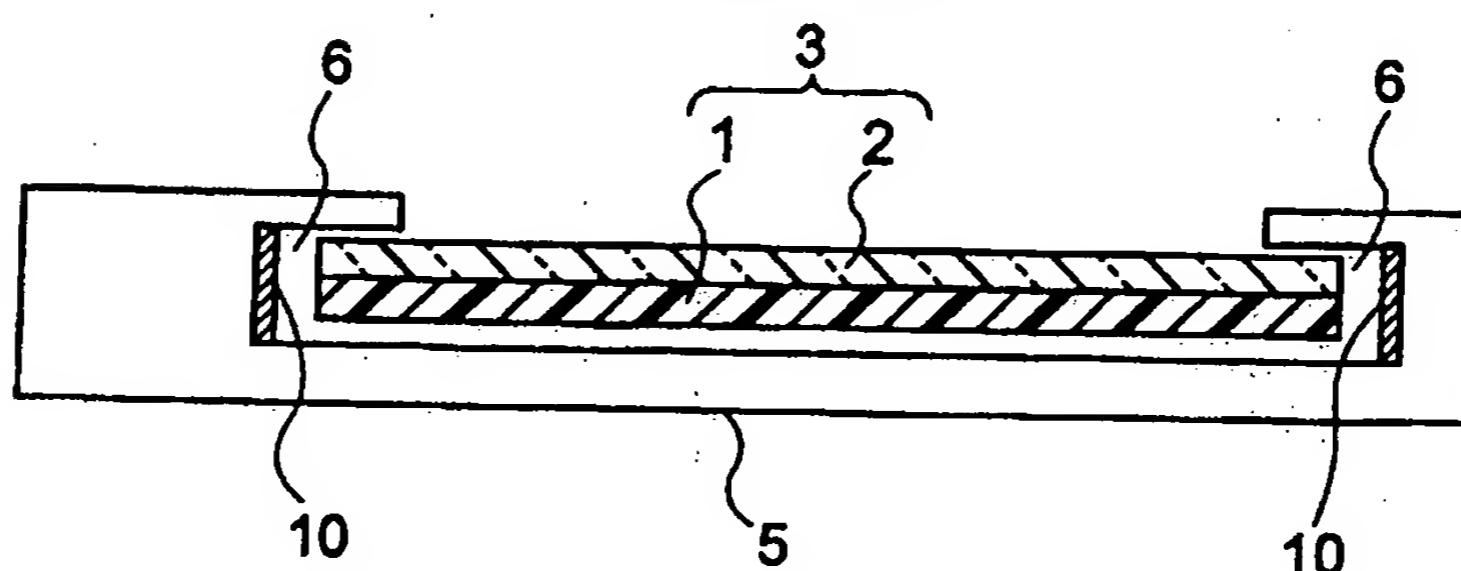


FIG. 4

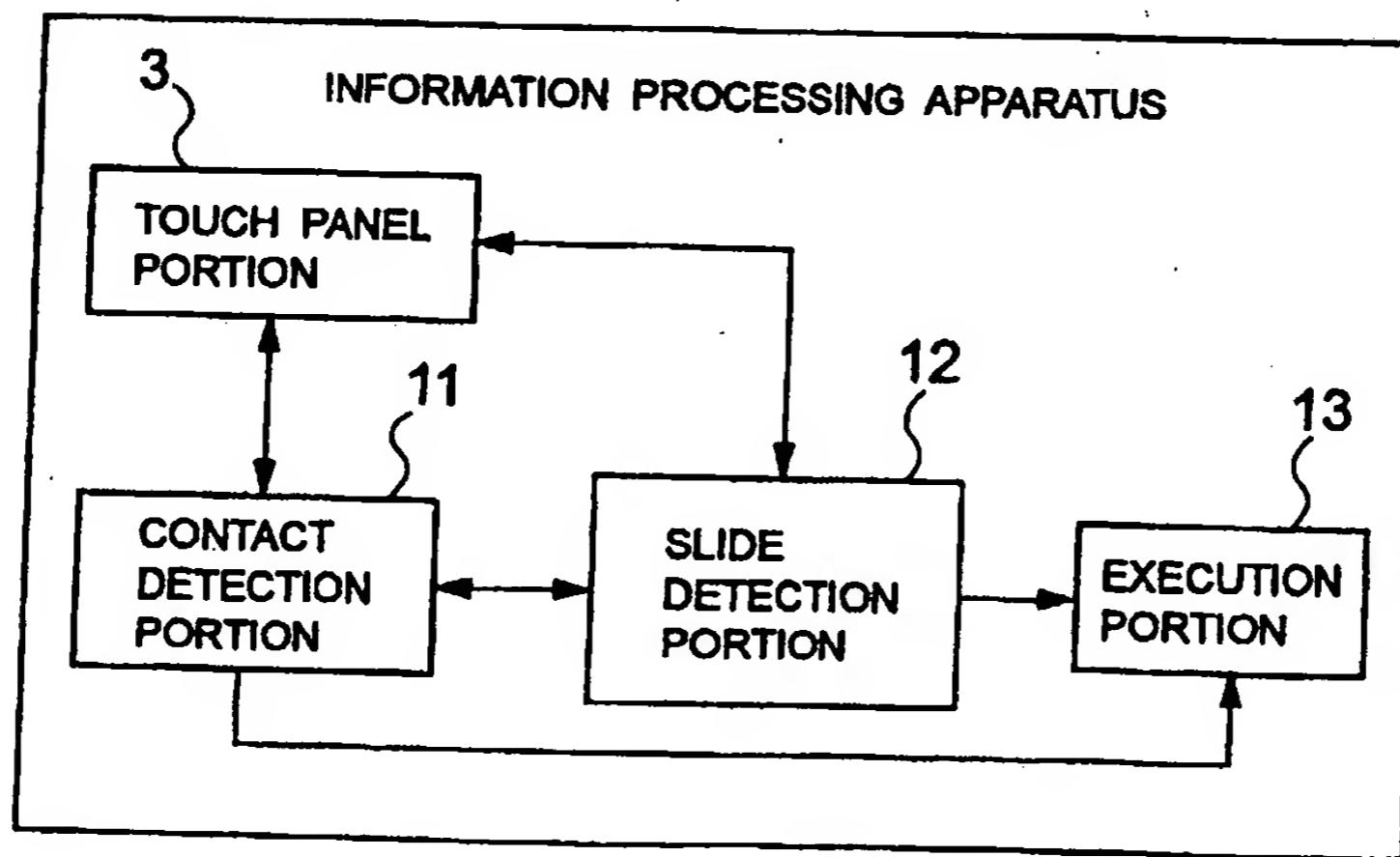
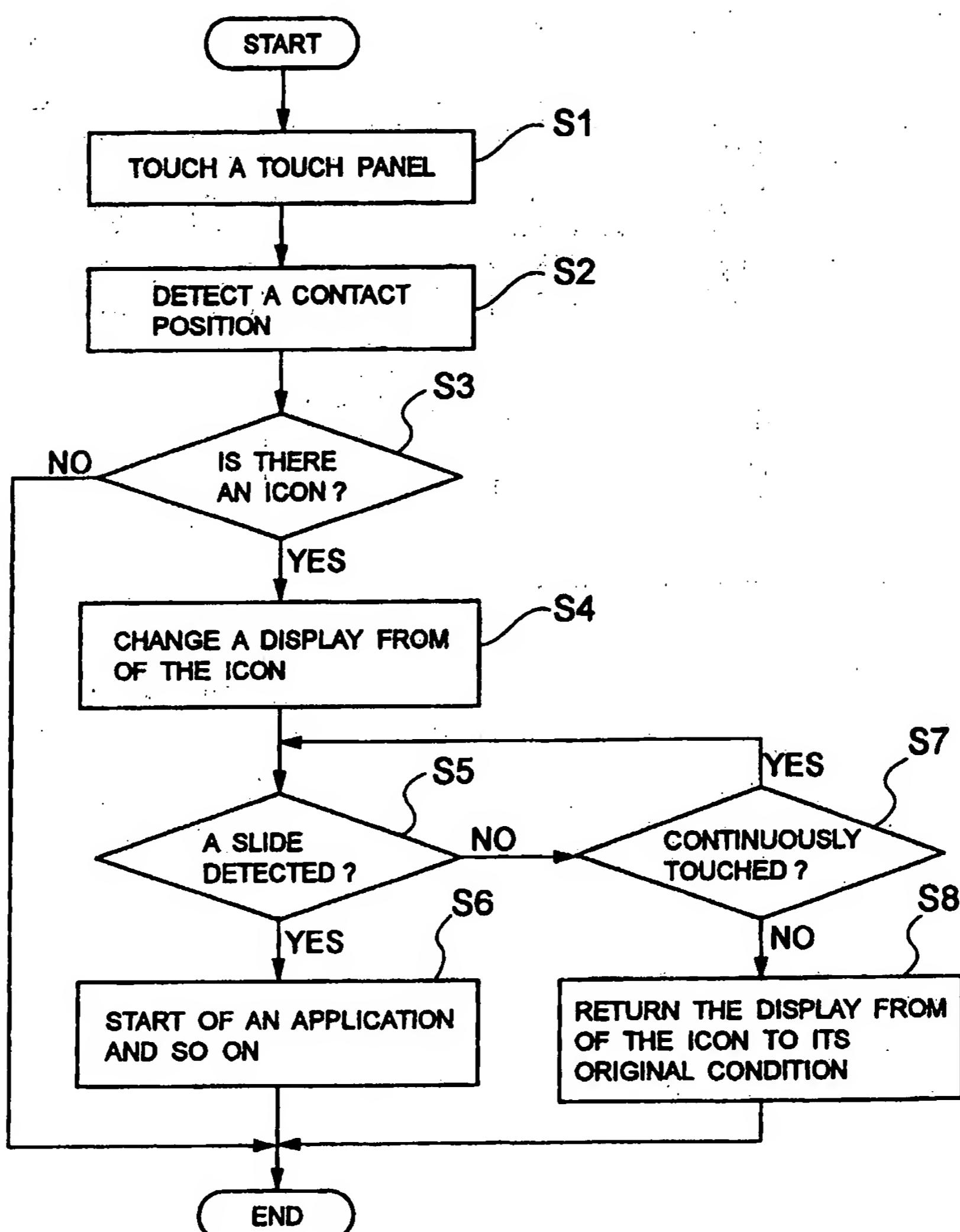
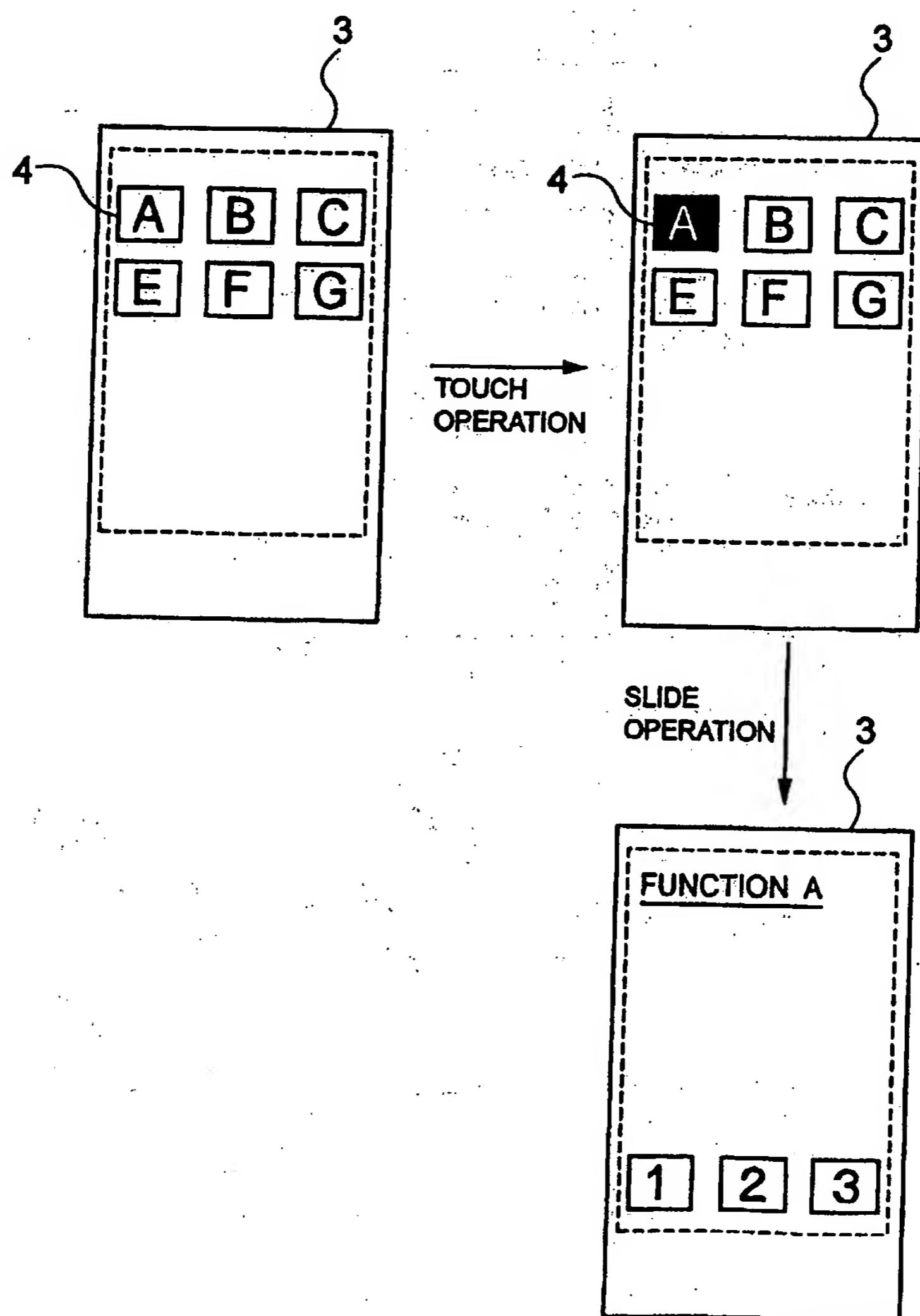


FIG. 5



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FIG. 6



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FIG. 7

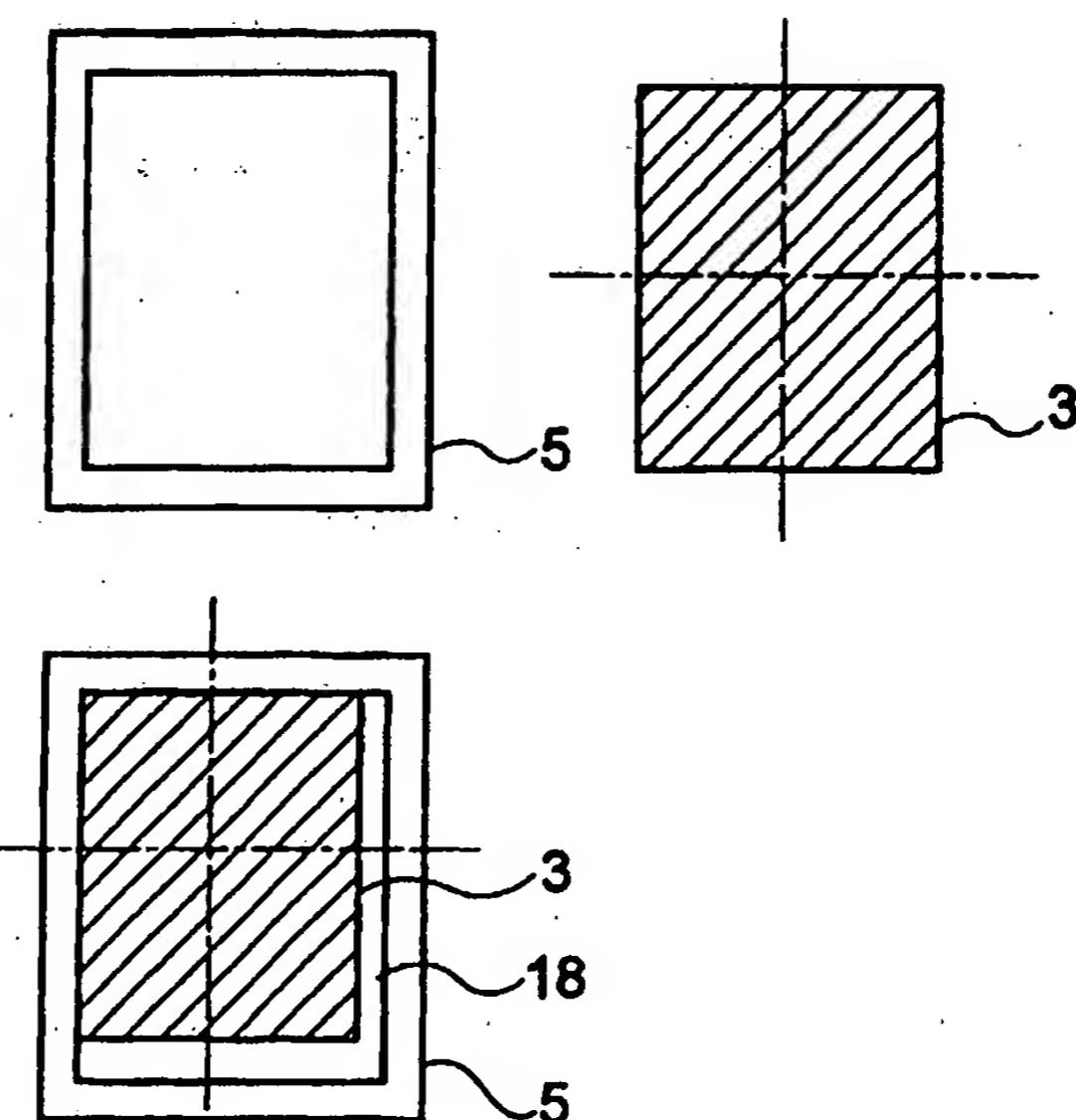
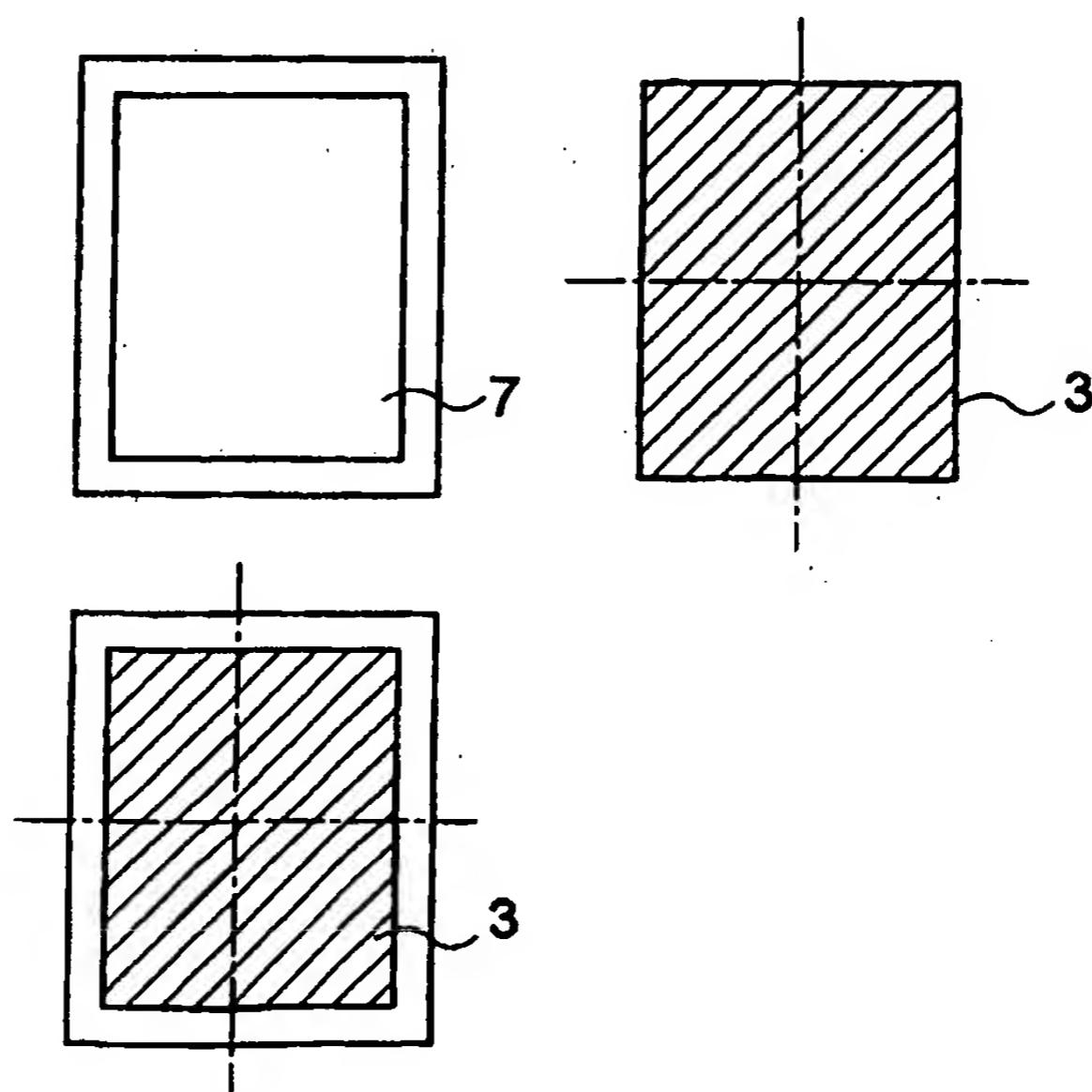


FIG. 8



INFORMATION PROCESSING APPARATUS

The present invention relates to an information processing apparatus, and in particular, but not 5 exclusively, to information processing apparatuses such as a portable telephone or a PDA (Personal Digital Assistant).

An information input apparatus in the past using a touch 10 panel such as a portable telephone or a PDA can, as its greatest characteristic, display only necessary information on a liquid crystal display panel when necessary and thereby provide a simple and easy operating portion such as a button.

Incidentally, there are the cases where a malfunction occurs 15 due to an unintended operation. In particular, in the case of the portable telephone, there are the cases where a transmission button is pushed by mistake while carrying it in a bag.

Here, Japanese Patent Laid-Open No. 2001-69223 discloses a technology for rendering a scroll operation easily and securely 20 performable in vertical and horizontal directions respectively to prevent the malfunction.

According to the above patent laid-open, the portable telephone has an X-axis direction scroll operating portion for performing the scroll operation in the horizontal direction 25 (X-axis direction) of a display screen and a Y-axis direction

scroll operating portion for performing the scroll operation in the vertical direction (Y-axis direction) of the display screen in a lower part and a left side part of a display portion respectively. It describes that these operating portions are 5 constituted to have a touch pad in long and thin shape so as to allow an instruction of the scroll operation independently in each direction.

In addition, Japanese Patent Laid-Open No. 2001-273080 discloses a technology to be applied to a portable information 10 terminal apparatus, for example, for the sake of constituting it to accept various inputs by operating an operation element so as to divert it simply to various apparatuses.

According to the above patent laid-open, it is described that the operation of the operation element on a control panel 15 is detected by the touch panel placed on an image display panel, and a processing program involved in this detection process is replaceable together with the control panel.

However, the technologies in the past perform the scroll operation and accept various inputs by operating the operation 20 element, and so there are the cases where they limit or prevent miniaturization, weight saving and low-profile making required of the portable information terminal such as the portable telephone or PDA.

The present invention seeks to provide for
25 information processing apparatus having advantages over known such apparatus.

To solve the above problem, the present invention is characterized by having a display portion for displaying an icon and slidable against an information processing apparatus proper, a contact detection portion for detecting contact with said icon displayed in said display portion, a slide detection portion for detecting a slide of said display portion against the information processing apparatus proper, and an execution portion for, in the case where said slide detection portion detects the slide of said display portion in a state in which said contact detection portion is detecting contact with said icon, starting an application of the icon and opening a file.

The present invention is advantageous in providing information processing apparatus which does not limit or prevent miniaturization, weight saving or low-profile making, and which can help prevent malfunction.

The present invention is described further hereinafter, by way of example only, with reference to the accompanying drawings in which:

FIG. 1 is a schematic perspective view of an information input apparatus according to a first embodiment of the present invention;

Fig. 2 is a schematic exploded perspective view of the information input apparatus according to FIG. 1;

Figs. 3 are sectional views between A-A and between B-B in FIG. 2;

FIG. 4 is a block diagram showing a schematic internal configuration of the information processing apparatus shown in FIG. 1;

5 FIG. 5 is a flowchart showing an operation of the information processing apparatus shown in FIG. 1;

FIG. 6 is a diagram for explaining operating situation of a touch panel portion of the information processing apparatus shown in FIG. 1;

10 FIG. 7 is a diagram showing sizes of the touch panel portion and information processing apparatus proper related to a second embodiment of the present invention; and

FIG. 8 is a diagram showing the sizes of the touch panel portion and information processing apparatus body related to the second embodiment of the present invention.

15 FIG. 1 is a schematic perspective view of an information input apparatus according to a first embodiment of the present invention. FIG. 2 is a schematic exploded perspective view of the information input apparatus according to FIG. 1.

20 The information processing apparatus shown in Figs. 1 and 2 has an information processing apparatus body 5 and a touch panel portion 3 comprised of a display 1 for displaying an icon 4 and a touch panel 2 including a piezoelectric element.

25 Its essential operation is to slide the touch panel portion 3 against the information processing apparatus body 5 in horizontal and vertical directions when starting an application program and opening a file corresponding to the icon 4 displayed on the display 1.

In addition, an operation key 8 of a power supply and so on of the apparatus and a speaker 7 are provided on the downside of the touch panel portion 3.

FIG. 3A is a sectional view between A-A in FIG. 2. FIG. 5 3B is a sectional view between B-B in FIG. 2.

As shown in Figs. 3A and 3B, a space 6 is provided to render the touch panel portion 3 slidable against the information processing apparatus body 5. The touch panel portion 3 is connected to the information processing apparatus body 5 by an 10 elastic body 9 such as a spring or rubber in order to return the slid touch panel portion 3 to its original position. In the case where no power for sliding is applied to the touch panel portion 3, the touch panel portion 3 keeps a central position.

While an example having the elastic body 9 provided on a 15 side face of the touch panel portion 3 is shown here, the elastic body 9 may be provided on a rear face of the touch panel portion 3.

Moreover, for instance, a piezoelectric element 10 for outputting an electrical signal on contacting the side face of 20 the slid touch panel portion 3 is provided on an inner wall of the information processing apparatus body 5. The piezoelectric element 10 may also be provided on the touch panel portion 3.

Furthermore, it is also possible to provide various sensors such as a light sensor and a magnetometric sensor, instead of 25 the piezoelectric element 10, for detecting a relative slide distance between the touch panel portion 3 and the information processing apparatus body 5.

FIG. 4 is a block diagram showing a schematic internal configuration of the information processing apparatus shown in FIG. 1. FIG. 4 shows a contact detection portion 11 for detecting contact with the icon 4 displayed in the touch panel portion 3, a slide detection portion 12 for detecting a slide of the touch panel portion 3 against the information processing apparatus body 5, and an execution portion 13 for, in the case where the slide detection portion 12 detects the slide of the touch panel portion 3 in a state in which the contact detection portion 11 is detecting the contact with the icon 4, starting an application program and opening a file corresponding to the icon 4.

Moreover, the contact detection portion 11 includes the piezoelectric element of the touch panel 2, and the slide detection portion 12 includes the piezoelectric element 10.

FIG. 5 is a flowchart showing the operation of the information processing apparatus shown in FIG. 1. FIG. 6 is a diagram for explaining operating situation of the touch panel portion 3 of the information processing apparatus shown in FIG. 1.

First, as shown in FIG. 1, if a user touches the touch panel 2 in a state of having the icon 4 displayed on the display 1 (step S1), the contact is detected and a contact position is further detected by the contact detection portion 11 (step S2).

Next, it is determined whether or not there is the icon 4 at the position detected by the contact detection portion 11 (step S3). As a result of the determination, a process shown in FIG. 4 is finished if there is no icon 4 at the position detected by the contact detection portion 11.

As a result of the determination, if there is the icon 4 at the position detected by the contact detection portion 11, the user is notified, by changing the display of the icon 4 as shown in FIG. 6 for instance, that the icon 4 was touched (step 5 S4).

Next, if the touch panel portion 3 is slid against the information processing apparatus body 5 in a state in which the user is touching the icon 4, which is detected by the slide detection portion 12 (step S5), the execution portion 13 starts 10 the application program and opens the file corresponding to the icon 4 as shown in FIG. 6 (step S6).

In the case where the slide of the touch panel portion 3 against the information processing apparatus body 5 is not detected by the slide detection portion 12, it is determined 15 whether or not the icon 4 is continuously touched (step S7).

As a result of the determination, in the case where the icon 4 is continuously touched, it returns to the step S6. In the case where the icon 4 is not continuously touched, the form of the display of the icon 4 is returned to its original condition 20 (step S8) so as to finish the process shown in FIG. 4.

Figs. 7 and 8 are diagrams showing sizes of the touch panel portion 3 and information processing apparatus body 5 related to a second embodiment of the present invention. If the touch panel portion 3 is slid against the information processing apparatus body 5, a dead space 18 arises as shown in FIG. 7, and a part of the touch panel portion 3 becomes invisible to 25 the user on the information processing apparatus body 5.

Thus, as shown in FIG. 8, it is possible, as for the touch panel portion 3, to change the displayable area of the icon 4 and so on based on the slide distance of the touch panel portion 3.

5 To be more specific, the slide detection portion 12 can detect the relative slide distance between the touch panel portion 3 and information processing apparatus body 5, and there is an image processing portion provided for software-wise displacing the displayable area of the icon 4 and so on in the touch panel 10 portion 3, for instance, based on the detection results.

As described above, according to the present invention, it is possible to provide the information processing apparatus which does not block the miniaturization, weight saving and low-profile making and prevents the malfunction.

CLAIMS

1. An information processing apparatus comprising:
 - a body portion and a display portion for displaying an icon and arranged to be slidable relative to the body portion;
 - contact detecting means for detecting contact with said display portion and at a location at which the icon is displayed;
 - a slide detecting means for detecting the slide of said display portion relative to the body portion; and
 - an execution means for commencing execution of a function responsive to an output from the slide detecting means and from the contact detecting means.
2. Apparatus as claimed in Claim 1 wherein the execution means is arranged for starting an application program and opening a file corresponding to the icon.
3. Apparatus as claimed in Claim 1 or 2, wherein

the display portion is mounted relative to the body portion in a resilient manner.

4. Apparatus as claimed in Claim 3, wherein the
5 display portion is mounted to the body portion by
means of at least one elastic member.

5. The information processing apparatus according
to Claim 4, wherein said elastic member is
10 connected to a rear face or a side face of said
display portion.

6. Apparatus as claimed in any one or more of
Claims 1 to 5, wherein the said detecting means
15 includes a piezoelectric element.

7. Apparatus as claimed in any one or more of
Claims 1 to 6, wherein said slide detection means
is arranged to detect a slide distance based on
20 movement of the said display portion relative to
the said body portion.

8. Apparatus according to any one or more of

Claims 1 to 7, and including image processing means
arranged to displace a region of said display
portion in an opposite direction to a slide
direction of said display portion and responsive to
5 detection results of the slide detecting means.

9. Information processing apparatus substantially
as hereinbefore described with reference to, and as
illustrated in, Figs. 1 to 6 and Figs. 7 and 8 of
10 the accompanying drawings.



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Application No: GB 0309456.2
Claims searched: 1

Examiner: Rupert Knights
Date of search: 20 November 2003

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A		US 2002/0027547 A1 IBM (figs. 1,3,6 & 10, see also paragraphs 88-92)
A		EP 1284450 A2 NOKIA (figs. 1 & 5, see also paragraphs 9 & 10)

Categories:

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art.
Y Document indicating lack of inventive step if combined with one or more other documents of same category.	P Document published on or after the declared priority date but before the filing date of this invention.
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Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKCV:

F2Y

Worldwide search of patent documents classified in the following areas of the IPC⁷:

G06F, H04M

The following online and other databases have been used in the preparation of this search report:

EPODOC, JAPIO, WPI